Gas Journal

VOL. 298. 111th YEAR. LONDON, APRIL 8, 1959 No 4995 PRICE 1/6

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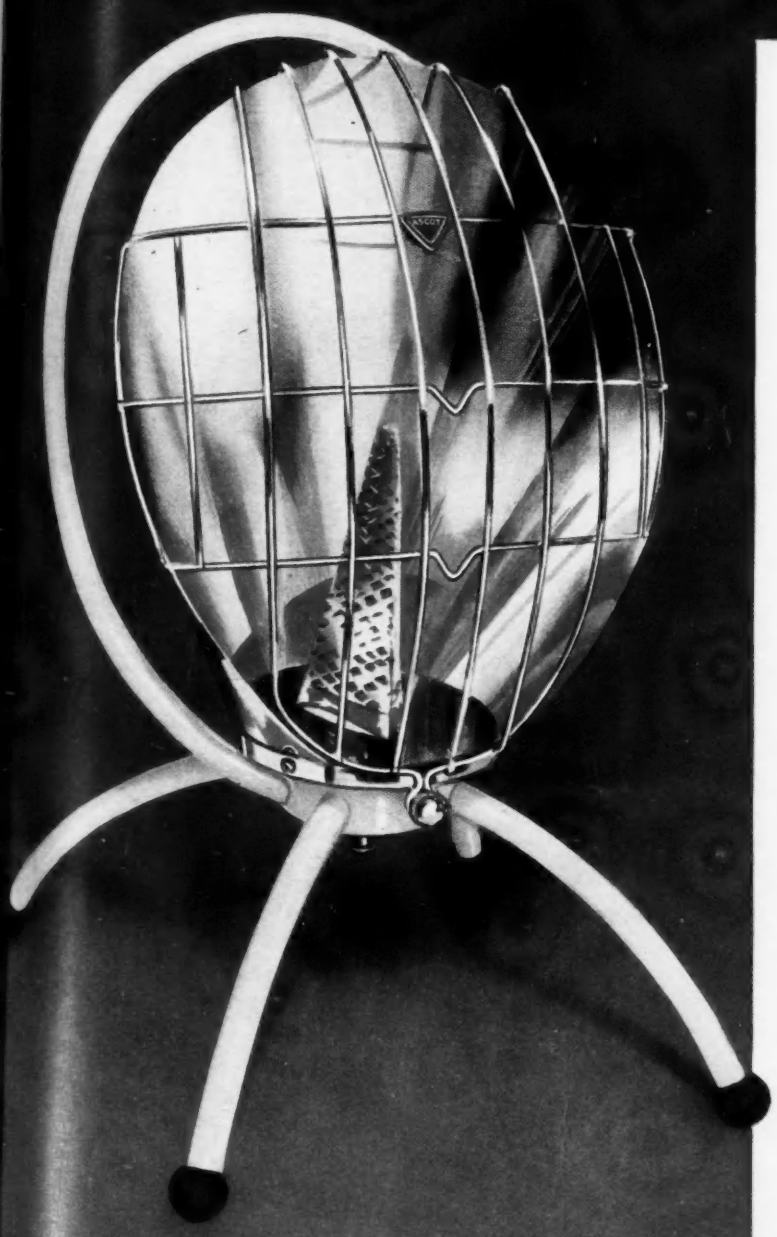

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6—7/58

Gas Journal

VOL. 298 *No. 4995* *APRIL 8, 1959*

IIITH YEAR

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Published by Walter King Limited,
11, Bolt Court, Fleet St., London, E.C.4
Telephone: FLEet Street 2236-7 **Telegrams:- Gasking, Fleet.**

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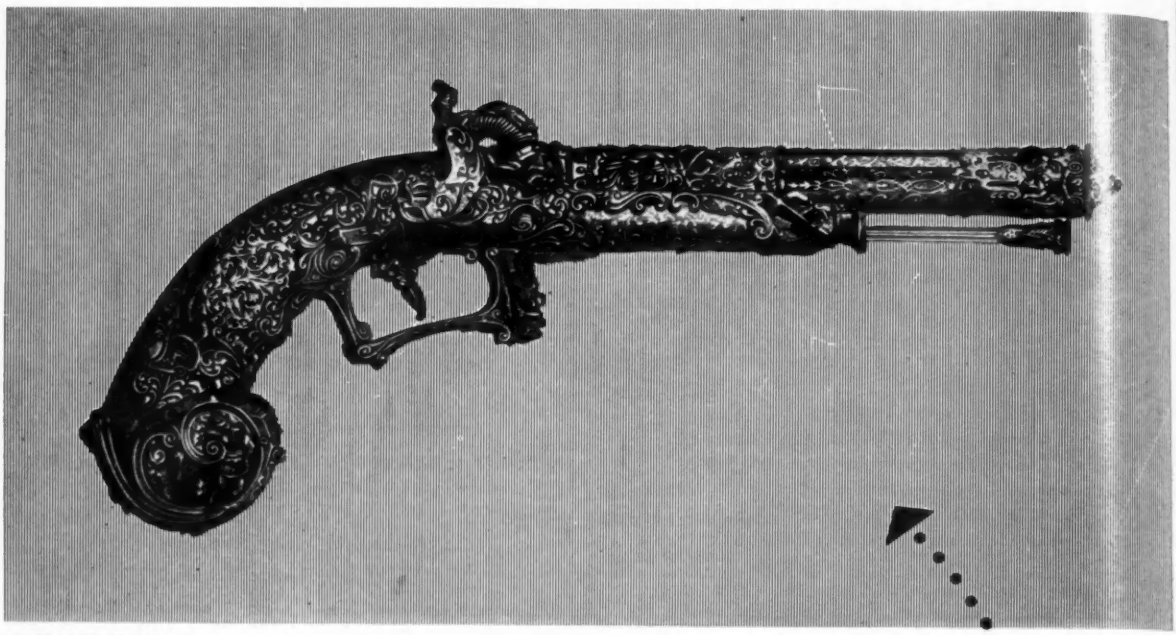

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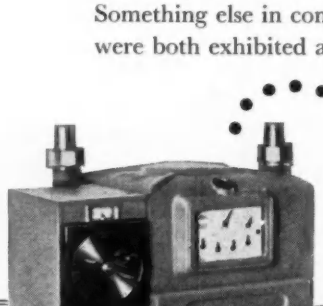
something in common

They remind one of different worlds, the Spanish forged iron pistol of 1850 and the modern T.G. meter. Yet, they have something in common—both are the products of true craftsmanship. The pistol delicately engraved and inlaid with damascene, designed and made by Eusebio Zuloago of Madrid, is presented as a fine example of the gunsmith's skill. The T.G. meter epitomizes craftsmanship and the T.G. 'G' prepayment mechanism is accepted as the most modern precision movement on the market.
Something else in common, this Spanish pistol and a T.G. meter were both exhibited at the Great Exhibition of 1851.



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Gas Journal

VOLUME 298. No. 4995 APRIL 8, 1959. 111th YEAR

The Contractor's Voice

DISCUSSION of a paper published in later pages reveals some surprise at the magnitude of both preparatory and follow-up work on new projects, and of the rôle which the contractor has played in the development and shaping of the gas industry. The surprise is easily understood. But the deceptive ease and precision with which such tasks are carried out on site is surely the result of theoretical mastery of the situation before so much as a brick is delivered, and this facility, in turn, is only possible because of specialisation in production and housing of plant; in other words in the generic problems of gas-making structures. While contractors have established themselves as part of the industry, they are sufficiently independent to have a voice of their own, born of a critical and indispensible notion of responsibility in seeing that every move is logically the next step and not just an expedient.

Some contractors limit themselves to certain spheres, while a few others are: 'In a position today, either alone or in association with others, to build complete works starting with a green site and finishing with a plant in full operation.' Those are the words of Mr. H. S. Cheetham, in the paper which is called 'The Contracting Gas Engineers' Service to the Industry.' In addition to being a director of the Woodall-Duckham Construction Co., Ltd., Mr. Cheetham is also a junior Vice-president of the Institution of Gas Engineers. From this right-angled position, so to speak, he can see equally well along the two lines of progress—the nationalised sector of the gas industry, and the contracting organisations.

In the early days, he points out, plants were generally designed by engineers of gas undertakings or consulting engineers. But today most plants are designed, built and put into operation by contractors, and since nationalisation the increasing size and complexity of works has brought about the tendency towards specialisation.

The important point about this transformation is that there is no longer room for trial-and-error techniques. The errors must be made in the laboratory and on the pilot plant provided by the contractors at their own expense. A great deal of time is spent on observing the ideas of overseas utilities which may be adapted for use here. The boards would appear to be asked to do very little after placing the order, the contractors even training personnel to run the plant. However, there is 'very close' collaboration with the industry in a number of directions, notably research, and engineers are provided to assist gas undertakings in this work.

Tendering for the bigger plants that are now required is extremely expensive and may take some months, so that projects would obviously not reach even that stage until a definite concept is reached. But it appears that there is a way of short-circuiting the usual method. The 'cost reimbursement basis' described in Mr. Cheetham's paper means that the client chooses a contractor who, he feels, is capable of seeing the whole project through, and he gives him the general outline. The contractor uses his experience to give a rough estimate of the entire job, and also states what his own fee would be. As the work progresses, the client pays out to the sub-contractors and for materials. Included in the contractor's fee, on the other hand, is the general direction of the contract, the preparation of specifications and drawings (other than those provided by the sub-contractors) obtaining sub-contracting tenders, placing orders, inspecting and testing. This method of securing contracts saves money over competitive tendering in two ways: First, it costs a great deal less and, secondly, the sooner plant goes into operation, the quicker does capital expended start to earn interest.

A survey evidenced that a number of contracts conducted by the Royal Institute of British Architects showed that out of an average of 38 months from the time that the architect first received instructions to proceed to the date of completion, 20 months were spent in planning, preparing bills of quantities and in tendering. Only 18 months were spent on building operations. 'The cost reimbursement basis' which the

gas and coking industries have adopted for some contracts, can only be another example of the value of the trust built up between the supply and the contracting sides of the industry.

One of Mr. Cheetham's questioners asks whether the contractor was 'still dictating the policy in future design of plant.' Perhaps some boards are only too glad to be dictated to by people with such a grasp of this aspect of their affairs. But the ultimate dictator will be the real needs of the gas boards, and that these can be provided for in a way that would be impossible without the virtuosity of the contractors may easily be seen by reading this revealing and detailed account by Mr. Cheetham.

Aurora Borealis

THE Northern Gas Board has always been reticent about its achievements—particularly in the field of technical development. A recent address by Mr. W. R. Garrett, the Board's Constructional and Consultant Engineer, to a joint meeting of the Northern Section, I.G.E., and the Northern Juniors, in which he spoke about the 'Past, Present and Future,' served to emphasise this fact. During a convivial occasion that was colourful both by virtue of the lantern slides and the uninhibited nature of the discussion it soon became apparent that the Northern Lights have shone with consistent radiance since nationalisation, albeit (to mix the metaphors rather improbably) hidden under a bushel.

Northern accomplishments lately, however, tend to have the improbable touch, the best known being the use of a converted saltmine as a gasholder. According to Mr. Garrett, justly proud of his Board's initiative, this is the first time a man-made cavity has been used for such a purpose, and he even considers it might be possible to store imported methane in this way—although not everyone agrees with him. After a time, he maintains, the ground temperature could be brought down until ice formation round the walls of the cavity brings complete insulation. Mr. Garrett also thinks that methane might be shipped into the Tyne or Tees; and that although the original conception of a penny-a-therm ex-methane gas has now settled down into the more realistic figure of sixpence, it is still an attractive proposition at that price.

That Mr. Garrett is a realist anyway is proved by his approach to the question of integration—a subject calculated immediately to create a strong reaction from both the hard-boiled and the idealistic. The Board now has 25 works (it had 55 to start off with) and Mr. Garrett thinks it will be difficult to cut down the level of plant much further, except by co-ordination with other boards through the Gas Council panel set up for this purpose. However, having thus concentrated production into what are really very few main units, the question arises whether there ever will be a cheaper source of gas-making fuel for the area than the excellent coal mined locally. Much depends, we imagine, on just how quickly inter-board co-ordination—in other words the national grid—can develop. Assuming that the boards remain autonomous, as far as production is concerned, for a very long time yet, the economics of providing for different kinds of manufacture are likely to be a bigger headache than in most areas. Liquid methane from overseas is the one exception to Mr. Garrett's own opinion that the present material is the best the Board can use—especially bearing in mind that there are no oil refineries in the area. Haulage overland of butane or oil would be impossibly expensive, although shipment is again a possibility.

The enigma of the Northern Gas Board is thus seen to be, in a sense, ironic: All the boards now are lustily and constructively competitive with each other, and new plant and methods rapidly usurp the old in the race for optimum efficiency. To be a gas board officer, particularly perhaps a constructional engineer, one has to be gifted with rare qualities of imagination and foresight as well as to have technical competence. And Mr. Garrett's Board has quietly been first with many new ideas; he mentioned a few at the meeting, among them using electrical anti-freeze to gasholders, running a commercial scale Onia-Gegi plant, laying a small-bore high pressure main, and so on. Yet the question that matters to them more than any other can only be answered in the course of time: 'Is the idea of bringing alternative fuels to Newcastle so ridiculous?' Mr. Garrett is obviously not unaware that if the transformation in other boards continues the local gas-making material will have to be supplemented quite extensively.

New Solid Fuels

THOSE with a flair for inventing words might profitably concentrate their talents on devising new names for solid smokeless fuels, a mushroom growth of which is in full spate. There were several proprietary brands in existence even before the gas industry weighed in such now established products as Phimax and Cleanglow. But the matter is not being allowed to rest there. Close on the heels of the North Thames Gas Board's announcement concerning Gloco comes the news (published on p. 57) that the South Eastern Gas Board is to produce Sebrite, a fuel which is particularly interesting in that it will contain peat.

Boards' intentions in producing these special fuels—it is not strictly accurate to call them super-cokes—vary. They are, in certain cases, attempting to cater for the householder with an old fashioned grate; they are trying to satisfy those who like the heat of their fire to be accompanied by visual flame; and they are endeavouring to sidestep the somewhat dubious qualities associated with coke in the public mind.

An important point to bear in mind is that for complete success all these fuels require acceptance (and not merely lip service) by the coal merchants. Recent correspondence in the *Manchester Guardian* and elsewhere (notably by Mr. F. C. Dobson, President of the Coal Merchants' Federation), coupled with the C.U.C.'s latest publicity campaign, must have cast serious doubts on that industry's willingness to play its proper part in the clean air movement. The fact of the matter is that coal merchants constitute an industry whose backwardness is equalled only by that of the building industry and whose cussedness is equalled by none. In our view the vast majority of merchants have little sympathy with the difficulties of customers and are quite abysmally ignorant concerning the fuel they sell. For this reason Britain will attain clean air in spite of their efforts rather than because of them.

Top purchase tax rates cut by a sixth

30% BURDEN ON SOME GAS APPLIANCES WILL BE REDUCED TO 25% FROM TODAY

MAKING his Budget proposals yesterday the Chancellor of the Exchequer said: 'I am leaving the general structure of purchase tax unchanged this year. The three higher rates of purchase tax will be reduced by one-sixth each.

The 60% rate will be reduced to 50%; the 30% to 25%; and the 15% to 12½%. There will be no change in the 5% purchase tax rate.' The changes were to take place as from today.

The Chancellor said that, expressed in real terms, the consumption expenditure had risen significantly since autumn of last year. The rise was largely in cars, refrigerators and washing machines, resulting from reductions in purchase tax and the subsequent removal of restriction in hire purchase.

'Removal of restrictions on hire purchase has turned out a useful method of providing a quick stimulant,' he said, 'but I expect that to fall off as the months go by.'

The Chancellor has repeatedly been asked to remove purchase tax from gas-fired domestic space heating appliances. In the last Budget he reduced purchase tax on some domestic gas appliances from 60% to 30%. The appliances affected were: Space heaters, including fires, portables and radiators, water heaters, heated towel rails, linen cupboard heaters, motor-driven washing machines, drying cabinets, gas pistols and lighters, and refrigerators.

Early in 1958 he had been presented with a petition organised by the 'GAS JOURNAL' and 'GAS SERVICE' in which many signatories, including 17 Members of Parliament, stated the case for abolishing the tax.

Gas Council films at festival

AMONG the films to be screened at the Festival of Films in the Service of Industry at Harrogate next month are three from the Gas Council and one from Thomas Potterton Ltd.

'All Lit Up,' surveying the use of fire for warmth since the days of the Romans, 'Paths of Progress,' showing research and development in the gas industry, and 'Centre of Attraction' depicting a focal point for London visitors, Hyde Park corner, are the Gas Council's contribution to the festival.

The process of manufacture of oil-fired boilers, with scenes taken at the company's works and foundry at Warwick, is the theme of the Thomas Potterton film.

A total of 113 films are to be shown at the festival.

Price reduction

Monaghan Gas Company has announced a reduction of 1s. 6d. per 1,000 cu.ft. in the price of gas, and further reductions are hoped for.

S.B.G.I. GOLFING CIRCLE MEETING

The S.B.G.I. Golfing Circle will be holding their Spring meeting on Monday, May 25, at the North Wales Golf Club, Llandudno.

On this occasion all members of the Institution of Gas Engineers who wish to take part will be competing for the Coronation Plate.

For further details apply to Mr. C. T. C. Woodall, Hon. Secretary, S.B.G.I. Golfing Circle, Radiation House, 7, Stratford Place, London, W.1. Telephone No.: MAYfair 6462.

SKYSCRAPER BLOCK FOR RADIATION H.Q.

Radiation Ltd. is to build a 13-storey office block on the North Circular Road at Neasden, London. This tower of reinforced concrete construction, 160 ft. high and 55 ft. square, will provide office and ancillary accommodation for the Directors and staff of the parent company, as well as for the secretarial, commercial and publicity departments for the gas, electrical, solid fuel and warm air divisions, and associated companies. Outline town planning approval has been granted and construction is expected to commence this year.

Gas and coke for healthier living

AT the Royal Society of Health Exhibition, to be held at Harrogate from April 27 to May 1 in conjunction with the Society's congress, the uses of gas in the home, office, factory, hospital and clinic will be displayed.

In the general field, there will be a range of six makes of water heaters on display—sink, multipoint, and storage types, and four gas fires, two gas radiators, a 2.2 cu.ft. capacity gas refrigerator, and a cooker.

In the more specialised field there will be a larger gas cooker (Radiation 90) which is suitable for a ward kitchen or small canteen, and a 7½ cu.ft. capacity gas refrigerator (Electrolux L.76). Ward-room equipment on show will be a hot closet, with hotplate on top (Radiation Ward 58), and a gas-fired steriliser by Manlove & Elliott. Two incinerators, the 3705 wall model by William Sugg & Co., Ltd., and the larger Main G.I.510, will also be included in the exhibition.

Coke appliances on view will be the Sofono Superview convector fire by Grange-Camelon Iron Co. Ltd. and the No. 3 projector fire made by Allied Ironfounders, Ltd.

Guide for architects

The latest in the series of special supplements sponsored by the Gas Council to appear in the *Architects' Journal* gives architects full technical information about the uses of gas and coke. This article deals with domestic water heating by coke. The series of supplements, when complete, will comprise an architects' handbook, and reprints will be available in bound form.

A limited quantity of the reprints can be obtained on application to the area gas boards or the Gas Council.

Sebrite—the new S.E.G.B. fuel—contains milled peat from Ireland

A NEW, specially processed solid smokeless fuel designed for use in smokeless zones will be marketed by the South Eastern Gas Board from May 1, the date when the Board's summer price scheme comes into force. The new fuel will be called Sebrite and it will be distributed directly by the Board and the merchants in South London and the surrounding districts.

Sebrite will be produced at the Board's works at Wandsworth, Croydon and Mitcham from washed coals of low ash content with which peat has been mixed. A contract has been placed with the Irish Peat Production Board for the supply of 30,000 tons of milled peat each year. Sebrite will sell at 5d. per cwt. more than ordinary coke, thus at the lowest summer prices operating on May 1 it will cost from 9s. 8d. per cwt. for quantities of 1 to 4 cwt. to 8s. 10d. per cwt. for quantities of 2 tons and over.

A publicity campaign will be launched to tell the public about the new fuel. Local papers, posters, cutouts and streamers for lorry headboards and merchants showrooms will all be used.

The South Eastern Gas Board's announcement follows closely the North Thames Gas Board's announcement concerning the specially selected continuous vertical retort coke called Gloco.

Personal notes, the obituary column, and diary of forthcoming events, are on the next page.

Personal notes

MR. G. NEIL, production engineer of the Southampton Region, Southern Gas Board, has retired. Mr. Neil began his career as a marine engineering apprentice at Walker-on-Tyne with a ship-building company and has served the gas industry for 37 years. His first contact with the gas industry was with Walker & Wallsend Gas Company (later amalgamated with the Newcastle & Gateshead Gas Company) as draughtsman and technical assistant. After a period as assistant works manager of the Howdon works, he was, in 1930 appointed works manager of the Hartlepool Gas & Water Company. Mr. Neil joined Southampton works in 1935 as works superintendent and there followed a series of promotions. At vesting date he took over as engineer and group general manager of the Southampton and district undertaking of the Southern Gas Board. When the Board was later reorganised he was appointed regional production engineer of the Southampton region. Mr. Neil has been at Southampton works for 24 years. Included in his other associations with gas, were periods as chairman of the North of England Gas Managers' Association and chairman of Southampton Joint Consultative Committees (staff and manual).

MR. ATHOL W. BROWN, who has been regional production engineer, Wight and Portsmouth, since November, 1956, is now Assistant Production Engineer at the headquarters of the Southern Board. Trained in Scotland his senior positions have included engineer and manager, Alloa Corporation Gas Department from 1942 till 1949 and, on nationalisation, district engineer and manager, Alloa district, until 1951 when he became deputy divisional controller, Northern Division of the Scottish Gas Board, based on Aberdeen. In 1954 Mr. Brown joined the Southern Gas Board as group manager at Reading, transferring to Portsmouth in November, 1956. Education has been one of his main interests following a period as lecturer in gas engineering (manufacture and supply) at Kirkcaldy Technical College, and maintained as a member of the Scottish District Committee of the Institution of Gas Engineers' Education Scheme. For four years Mr. Brown was Secretary of the Scottish Association of Gas Managers and President in 1954. He was also a district member of the Council of the Institution of Gas Engineers and a member of the Scottish Fuel Efficiency Committee.

MR. J. C. HOGG, who now takes up the appointment of Regional Production Engineer of the Wight and Portsmouth and Southampton Regions, entered the gas industry in 1933. Leaving Stretford as assistant engineer and manager he joined the Southern Gas Board in 1950 as general manager, Bournemouth Group. In 1957 he was appointed regional production engineer, Dorset and Bournemouth Region. His interest in the educational side of the industry has led to his serving as a district secretary and a member of the Institution's Education Committee, and on its Board of Examiners. He is a governor of the Poole College of Technology. This year he is Chairman of the London and Southern Section of the Institution of Gas Engineers and a member of Council.

MR. W. STEPHENSON has retired from his position as the North Western Gas Board's smokeless solid fuels officer, but will continue to serve the Board in a consultative capacity. His successor is his deputy, MR. R. A. W. HOLLINGDALE. Starting as a 5s.-a-week office boy for the local colliery group of companies, Mr. Stephenson studied at night school, took correspondence courses, and eventually became chief executive officer, and administrative secretary. In 1939 he was appointed Secretary of the Lancashire and District Coke Association, being chosen from 476 applicants. He was appointed coke officer to the North Western Gas Board on nationalisation. Mr. Hollingdale, who took over his new appointment on April 1, became marketing officer for coke in Cardiff for the South Western Division of the National Coal Board in 1950. He joined the North Western Gas Board as deputy coke officer in October, 1952.

DR. A. E. HAFFNER has been appointed a member of the Southern Gas Board. He will combine the duties of Board membership with those of his present position as Chief Engineer to the Board.

MR. C. R. AUSTEN, previously officer-in-charge, meter laboratory, Watson House, recently commenced his appointment as Research Controller in the meters division of United Gas Industries Ltd.

MR. J. D. C. WOODALL has been appointed Sales Manager of the South Eastern Gas Board. Until April 1, he was Assistant Commercial Sales Manager of the Board.

MR. JOSEPH MORLEY, who has been associated with Meters Ltd., for 62 years, has retired. Mr. Morley, who was chairman for 17 years, gave up that position in 1953 but retained his seat on the board.

MR. FRANK WHITE, has retired from his post as chief supply officer, South Eastern Gas Board. He was educated at St. Dunstan's College, Catford, and the City and Guilds (Engineering) College, later receiving workshop training at the Royal Ordnance Factory, Woolwich, London.

In 1920 he joined the South Metropolitan Gas Company as engineering designer. Other appointments include those of civil engineer of the South Metropolitan Gas Company and station engineer of East Greenwich works. In 1946 he became the company's distribution engineer. He was made chief supply officer, South Eastern Gas Board, in 1949, in which capacity his duties included, inter alia, responsibility for the Board's transport and the appliance and meter repair workshops. As a member of the Institution of Gas Engineers he did considerable work on its behalf in the field of technical education and, among other things, served on the board of examiners, on the education and gas distribution committees, and, as the Institution's representative, on the joint committee of the Ministry of Education and the Institution of Civil Engineers.

Obituary

SIR ASHLEY WARD, president of Thos. W. Ward Ltd., has died, aged 81. He had been with the company for over 50 years, establishing its Silvertown works, of which he was in charge for many years before returning to Sheffield headquarters.

MR. H. C. (HARRY) WOOKEY has died aged 64—a few months before he was due to retire. He was commercial assistant, with the Bristol/Bath Division of the South Western Gas Board. Mr. Wookey joined the Bristol Gas Company in 1913. During the first world war, while acting as observer for the Royal Flying Corps, he was shot down over Germany and sentenced to death at a court martial for dropping propaganda leaflets. Britain threatened reprisals and he was later sentenced to life imprisonment.

MR. JOHN WILLIAM HAYES, who was manager of the Staveley Gas Company for 20 years, during which time he was made a director, has died aged 85.

Diary of forthcoming events

April 9.—NORTHERN JUNIORS: Newcastle-upon-Tyne. Paper by Mr. R. F. Hayman, Industrial Gas Officer to the Gas Council, entitled 'Gas in Industry.' 2.30 p.m.

April 9.—NORTH THAMES G.C.C.: Westminster City Hall, London, W.C.2. Council meeting at 2.30 p.m.

April 10.—I.G.E. MANCHESTER AND DISTRICT SECTION: Queens Hotel, Manchester. Annual general meeting. 2 p.m. Preceded by luncheon at 1 p.m.

April 10.—MIDLAND JUNIORS: President's Day. Inspection of the oil gas plant and compressor installation at Bilston, or inspection of the Dudley works compressor station. Luncheon at 1 p.m. Visits to a carpet factory, Wightwick Manor or a National Coal Board mine.

April 10.—JUNIOR INSTITUTION OF ENGINEERS: Pepys House, 14, Rochester Row, London, S.W.1. Paper on Radiography and its Application to Arc Welded Joints' by R. F. Wilks. 7 p.m.

Isle of Man

DISADVANTAGES OF COMPETING WITH STATE INDUSTRY

DIFFICULTIES of utility companies were emphasised by Mr. W. C. Kelly, Chairman of the Port Erin and Port St. Mary Gas Co. Ltd. (Isle of Man) at the annual meeting of the company.

'It would be idle to pretend that the long-term outlook for a small utility company like ours is free from difficulty,' he said. The company, he said, had to compete with the Electricity Board, a nationalised organisation with all the advantages of Government interest and many resources which they lacked. He was, however, hopeful that an awareness of the need for Government consideration of the problems of a company which had for so long provided an essential service to the local community, might be fostered.

'Domestic coal,' he said, 'earns a freight rebate of all charges over 15s. a ton, but we pay the full freight for coal we process into gas and coke sold to domestic users.

'The company even pays rates on underground mains, while the Electricity Board erected its poles and overhead cables without having to pay a penny in rates. Some easement in that matter would be extremely helpful.'

Despite the reduction of approximately 4½% in the production of gas, total sales amounted to £19,220, an increase of £239 on the 1957 figures, due to the necessity of having to increase the selling price of gas and coke during the year.

Forty years on

Donald Macpherson & Co., Ltd., held their annual general sales conference recently, and the opportunity was taken to make a presentation on their behalf to Mr. W. A. Lowe, who recently retired from his executive position of sales director after almost 40 years' service with the company.

Government committee will review consumer protection

THE Government intends to set up a committee to consider the question of consumer protection.

This was announced in the House of Commons during a debate on a motion by Mr. F. Willey (Lab., Sunderland N.): 'That this House urges Her Majesty's Government to review the present safeguards to protect the consumer and to ensure that they are effective; to encourage organisations seeking to assist the consumer and improve standards; and to provide, where necessary, further safeguards.'

He suggested that there should be a consumers' council. Such a body would help to promote such campaigns as 'Guard That Fire,' matters which do not ordinarily come within single departmental responsibility.

'I should like such a body to be in touch with the nationalised industries. I doubt whether the consultative machinery for the consumers of the products of nationalised industries has been altogether effective, but there is no reason why such a body should not bring the nationalised industries within its umbrella,' he said.

Mr. A. Greenwood (Lab., Rossendale) said: 'We believe that in hire purchase there is still too much deception. We believe that charges are very high in many cases. That does not mean that we are saying that all firms are bad. Certainly, most of them, I think, behave very well indeed. The nationalised industries, too, set an outstandingly good example, but there are far too many firms operating which do not live up to the high standards one expects of finance houses."

Mr. John Rodgers (Parliamentary Secretary, Board of Trade) said: 'The Government intends to set up a committee to consider this whole question of consumer protection. I regret that I am not in a position to announce the terms of reference, nor am I in a position to name the chairman or the members who will constitute that committee, but I shall hope to do so as soon as possible.'

FINE FOR DROP IN PRESSURE

A FINE of £1 was imposed on the Scottish Gas Board at Edinburgh Sheriff Court when a plea of guilty was tendered to a charge of permitting pressure in a gas main at Musselburgh, Midlothian, to fall below the permitted minimum.

The Deputy Fiscal said that the prosecution had been advised by the Ministry of Fuel, one of whose inspectors had noted the fall in pressure. On this occasion police and Gas Board staff made a tour of the Musselburgh area, checking that no danger had ensued.

A solicitor for the Scottish Gas Board said that a workman had been switching the supply feed from one gasholder to another. Because of an oversight, he switched off both feed valves, and pressure fell rapidly because a booster device was drawing gas from that particular main for another supply. The Gas Board was installing throughout Scotland an interlocking switch-feed device to prevent this kind of mishap.

TRADE-IN DISCOUNT REDUCTION BRINGS G.C.C. PROTEST

AT a recent meeting of the Gas Consultative Council in Leeds a protest was made against the North Eastern Gas Board's recent decision to reduce by 25% to a maximum of 30s. the trading-in allowance for an appliance being replaced by a new one. The scheme was introduced in May, 1957.

It was reported to the meeting that for the year ending March 31 this year it was estimated that £36,000 was paid in allowances and during the following year the figure would total about £45,000. A 25% reduction in allowances was estimated to save £10,000 a year.

An amendment that protest be made to the Board against the reduction in trading-in allowances was carried on a vote.

The Council was informed that uniform hire-purchase terms had been adopted by the gas and electricity industries as follows: Cookers—a maximum payment of 5% and a maximum period to pay of 5 years.

Water heaters and wash boilers—10% and a maximum period of 4 years.

Other apparatus—10% and 3 years.

The date of the next meeting of the Consultative Council will be Monday, May 25.

INDUSTRIAL WELFARE SOCIETY COURSE

A FIVE-DAY residential course designed to equip employees to instruct their colleagues in kinetic methods of manual lifting and handling has been organised by the Industrial Welfare Society, in association with the Central Council of Physical Recreation, and will be held at Victoria Court, Eastbourne, from April 20 to 24.

Delegates will be given the opportunity to practice correct lifting and handling methods and to become familiar with elementary physiology and teaching techniques.

A survey of the need for improved operator training techniques will be presented by Mr. W. Douglas Seymour of the Department of Engineering Production, Birmingham University, at a two-day course for works managers, also organised by the Industrial Welfare Society. The course will be held at the Hotel Rembrandt, Thurloe Place, London, S.W.7, on April 29 and 30. The address of the Society is Robert Hyde House, 48, Bryanston Square, London, W.1.

Approved appliances

The Gas Council have recently published the third edition of their 'List of Tested and Approved Gas Catering Appliances.'

Available free of charge from area gas board offices and showrooms, the list—first published in 1956—is issued as a companion publication to the Council's domestic appliance list.

From a paper to a joint meeting of the East of Scotland Junior Gas Association, in Glasgow, March 7.

The Contracting Gas Engineers' Service to the Industry

By H. S. CHEETHAM, M.Inst.Gas E., M.I.Mech.E., F.Inst.F.,
DIRECTOR, THE WOODALL-DUCKHAM CONSTRUCTION CO., LTD.,
JUNIOR VICE-PRESIDENT, THE INSTITUTION OF GAS ENGINEERS.

FOR the benefit of those who may have joined us only in recent years, it may be of interest to them to know that in the early days of our industry, plants in general were designed by engineers of gas undertakings or by consulting engineers. The consulting engineers were engaged by gas undertakings to design various types of plant and to arrange for their fabrication and subsequent erection and operation. Gradually, however, the contractors applied their knowledge and experience in design, as well as in the other branches of the work, and so, today, we find that most plants are designed and built and put into operation by contractors. This expression of the confidence of the gas industry in their contractors has played a most important part in developments of both processes and plants, for the first essential always is to secure the willingness of those concerned to pioneer with the contractor.

Since the nationalisation of the gas industry the size of works has increased as their numbers have decreased. Unit capacity and efficiency of plants have increased; they have become more complex; and this has brought about an increased tendency for contractors to specialise. There are, however, a few firms who are in the position today, either alone or in association with others, to build complete works starting with a green site and finishing with the plant in full operation. It will be realised that to undertake major schemes such as this the contractor must have in his employ highly qualified personnel in the fields of civil, mechanical, chemical and electrical engineering as well as in gas engineering. He must also have a substantial turnover and a large staff and field force.

Assessing Suitability

Whether a contractor specialises in a particular process or type of plant or whether he is a builder of complete works, it is his constant endeavour to keep in close touch with all technical developments in various parts of the world. He does this by making frequent visits to other countries where usually he has associates who collaborate closely with him, frequently on a reciprocal basis.

Having become aware of the development of a new process abroad, the contractor is faced with the problem of assessing its suitability for use in his own country. This is a very real problem since conditions vary so widely from country to country and it is sometimes necessary for the British contractor to build trial plant in this country, entirely at his own expense, before he considers it safe to offer the process or plant to the British gas industry.

It is not always realised that a contractor frequently spends large sums in the development of a particular process or plant and it may be a matter of years before he is able to secure any return on his expenditure. Indeed, there are cases where such a process may be abandoned on account of its unsuitability for British conditions and, in such a case, the contractor receives no reward for his efforts.

In considering how a contractor's business might be organised to meet the requirements of the gas and coking industries, my remarks will, of course, be based on the organisation with which I am associated—essentially complex but integrated in all its branches.

Co-ordination

Considering the sales department first, here a contractor will endeavour at all times to provide a staff of highly competent engineers capable of discussing projects, both technically and from an economic aspect, with the prospective client. These discussions may be continued over a period of years before a definite invitation to tender is received. The client's enquiry may be accompanied by a more or less complete specification or it may be only in broad outline stating the gas production required, the type of feedstock—solid, liquid or gaseous—which is available, and giving general particulars of the site. In either case the sales department will go to work co-ordinating all associated departments to ensure that the scheme, when finalised, is best suited to the particular requirements. This may, in some instances, entail the production of a variety of layouts by the project section of the drawing office before the ideal scheme is produced and is to the satisfaction of the prospective client as well as to the contractor.

In the preliminary stages of the project the contractor's design and development department will be closely associated with the work. This department will advise in regard to special features in design, the yield obtainable from a particular feedstock, and the guarantees which may safely be furnished, all with a view to ensuring the greatest safety, efficiency and convenience in the operation of the plant. Much of the design data of a particular type of plant is based on past experience and is covered by a long series of design minutes covering all aspects of design for the guidance of all departments.

These design minutes are based on a close study by the development department of reports furnished by the construction and operating departments concerning plants which have been put to work under widely varying conditions and covering, also, the operating depart-

ment's subsequent service visits over a number of years. Close consultation with the drawing office is maintained and their opinions are given due consideration before a design minute is written, amended or superseded.

It should be noted especially that the development section makes a most important and valuable contribution to the design of new plants by carrying out detailed investigations on those plants which the contractor has already built and put into operation and by examining new processes and plants in any part of the world in order to advise on their possible application under conditions and circumstances in the countries in which the contractor may do his business. Another function of the development department is the study of reports appearing in the technical press and of patent literature.

When a project has reached the stage where it is considered technically and economically sound and generally in accordance with requirements, the prospective client will request a tender and the project is then taken in hand by the estimating department. They will prepare detailed estimates of the cost of carrying out the various sections of the work. In so doing they will, where possible, draw upon records of costs of similar plants which the contractor has already built. Where, however, as frequently occurs, there is a considerable variation of an earlier feature or where a new design and/or new process is involved, the estimator will require and receive appropriate drawings from the project section of the drawing office.

The estimator's work falls into three parts: (1) Taking out quantities and weights; (2) pricing these quantities and weights; and (3) estimating the cost of delivery and the erection on site.

Planning Committee

It often happens in the case of processes and plants newly-introduced that the estimator does not have in his possession recent prices for certain components. In such cases he will issue enquiries to specialist suppliers and the lowest prices received, after paying due regard to quality and delivery time, will be included in the estimate. It will readily be seen that the preparation of a specification and tender, with tender drawings, for a large plant is costly and time-consuming. Three months or more may be occupied in the work and, during that time, some three or four highly qualified draughtsmen and at least an equal number of estimators may be wholly engaged on the project.

Before the tender is submitted to the client, a meeting of the contractor's 'contract planning committee' will be convened. At this meeting senior representatives of the departments associated with the provision of apparatus and materials will consider all the relevant specifications and drawings and will state their views on the time required to carry out each portion of the work. Due regard will, of course, be given to existing commitments. The time required to complete an installation is decided by consideration of a summation of the periods needed by the drawing office to prepare the detailed drawings, the civil engineering section of the construction department to prepare foundations, etc., the supplies department to obtain the apparatus and materials, the construction department to erect the plant and the operating department to put it to work and train the client's personnel.

All is now ready for the proposal to be submitted to the prospective client.

It has been mentioned above that the preparation of a proposal comprising tender, specification and tender drawings is costly and time-consuming, and, so far as time is concerned, it may be that a period of six months or more may elapse from the time the client commences to draw up the specification, which accompanies his invitation to the contractor to tender, until a contract is finally placed.

It was stated recently that a survey of 311 industrial building contracts conducted by the Royal Institute of British Architects showed that out of an average of 38 months from the time that the architect first received instructions to proceed, to the date of completion, 20 months were spent in planning, preparing bills of quantities and in tendering. Only 18 months were spent in the actual building operations.

In order to save valuable time in the completion of large installations of plant, an alternative to competitive tendering has, in some cases, been adopted in the gas and coking industries. It is sometimes known as the 'cost reimbursement basis' and, in such a case, the procedure is as follows:

(1) The client selects a contractor with whom he would be prepared to entrust the building of the works.

(2) The client provides the contractor with a very general outline of the works which it is proposed to construct.

(3) Without going into great detail which, in any event, is impracticable at this stage, the contractor prepares an approximate estimate of the actual cost of carrying out the work and submits this estimate to the prospective client. At the same time the contractor states that in respect of his services, including an amount to cover overhead charges and profit, he would be prepared to accept a fixed fee of a certain sum which will, of course, bear a definite relationship to the type of plant, the extent of the work and to the estimated cost.

On this cost reimbursement basis the purchaser of the plant would pay the actual disbursements by the contractor, of which the client may receive detailed particulars, and the prescribed fee which would remain fixed irrespective of the ultimate cost, provided, of course, that the general outline of the work was not increased to a substantial extent.

Conditions of Contract

The fixed fee constitutes the only payment to the contractor in respect of the preparation of specifications and all drawings other than those which may be provided by his sub-contractors; obtaining and assessing tenders from sub-contractors and placing orders therefor; progressing, inspecting and testing all apparatus and materials purchased; and the general direction of the contract. As mentioned, the principal advantage of the cost reimbursement basis is the saving of time. If a plant can go into operation six months earlier, the capital expended starts to earn interest that much sooner and, in the case of a large contract, the savings may be very substantial.

Whatever may have been the basis of tendering, we will assume that the contract has been secured and will consider how the various departments of the contractor's organisation play their parts in expediting the work.

First of all, it will be necessary for the sales department, in collaboration with the secretarial department, to agree the 'general conditions of contract' with the client and it is likely that the parties will select as a basis the 'General Conditions of Contract Approved and Recommended for Adoption by the Gas Council and the Society of British Gas Industries—March, 1956.' Complete agreement on terms and conditions is of the greatest importance in avoiding misunderstandings in the course of work being carried out.

All contract documents having now been agreed between the client and the contractor, the execution of the work will become the responsibility of the construction department who will receive copies of all contract documents. The construction engineer who is attached to the head office organisation will discuss and agree with the client all outstanding points of detail or any changes which may be desirable in the specification and, in effect, he becomes the link between the client on the one hand and the contractor's drawing office and design department on the other.

Drawing Office

Later it will be the responsibility of the construction department to appoint the site staff, recruit the necessary workmen and ensure that all necessary tools and tackle and handling plant are made available and delivered to the site. It should be mentioned that the most important responsibility of the department is to ensure that the contract is carried out expeditiously and within the time prescribed.

Apart from proceeding with site organisation, the construction department cannot go very far in the building of a plant until appropriate drawings have been provided by the drawing office and it may be of interest here to consider what is comprised in a drawing office such as that in the organisation with which I am associated.

The overall control of the drawing office is in the hands of a chief engineer and a deputy chief engineer. It is divided into four main sections and each section is under the control of a chief draughtsman. Under the chief draughtsman are section leaders, designers, improvers and students as well as a number of tracers. There is also a further small section of the drawing office which deals with publicity and educational matters, etc.

Section 'A' of the drawing office is concerned entirely with projects and, as has been stated earlier, this section works in close liaison with the sales department in the production of project drawings and tender drawings for the various enquiries which are in hand. In the case which we have under consideration, the project section has, of course, completed its work and will have handed over its scheme drawings with associated lists of materials, etc., to other sections of the drawing office.

Section 'B' of the drawing office is concerned with civil engineering work, including reinforced concrete structures, structural steelwork and the layout of coal and coke handling plants, etc.

Section 'C' of the drawing office is concerned with the design of refractories for retorts, ovens, producers, generators for coal and oil gasification and special linings for CO conversion plants, heat exchangers and coolers, etc. This is a department where long experience in this particular design work is of the greatest importance.

Section 'D' is responsible for the mechanical engineering involved in the contract. It deals with matters such as by-product plant, boilers, reactors, pumps, engines, and steam, oil, water, oxygen and effluent systems. In this department there are sub-sections each dealing primarily with its own specialised portion of the work.

Within a comparatively short space of time after the contract has been taken in hand by the drawing office the issue of working drawings commences and they will come forward in a steady stream and in a planned sequence until all drawings have been completed. These drawings will be received by the construction department who will issue them as appropriate to the client, to the site engineer and/or to the supplies and services department.

The supplies and services department, working in conjunction with the construction department, is responsible for the planning, purchasing and progressing of all the supplies of apparatus and material which are required for the construction of the plant. This department decides upon the extent to which the services of sub-contractors are required and considers all matters in connection with the provision of materials, not only for new plants but for the repair and maintenance of existing plants.

It will be understood that a contractor providing plant for the gas, coking, steel and oil industries must draw very considerable supplies of materials and equipment from a wide range of manufacturers. Large tonnages of basic materials are required and, in order to ensure that these shall arrive on site at a pre-determined time, it is necessary for plans to be made well ahead. To ensure adequate contract planning there must be a well-established policy of entering into forward arrangements with suppliers to purchase from them over stipulated periods all the many materials such as steel, silica and firebrick materials, castings and ancillary plant components, etc.

Bulk purchasing of apparatus and materials is of advantage not only to the contractor, but to the client and to the sub-contractor. It enables the contractor to purchase at favourable prices and, also, suppliers welcome such arrangements since they are provided in advance with particulars affecting their manufacturing load and they, in turn, can plan to do the work economically.

Placing Orders

There are, of course, many components in a plant which do not lend themselves to bulk buying or to a negotiated price agreement. These are obtained on a competitive tendering basis. Drawings received by the construction department from the drawing office, and particularly those which require materials to be purchased, are passed to the planning section who will indicate, in each case, the delivery date required in order to conform to the erection programme. The drawings are passed from the planning section to the purchasing section who place the necessary orders. It may be noted that a copy of every order placed with a sub-contractor is filed by the progressing section in a visual system which signals the delivery period required and records

all steps taken in progressing until delivery has been completed.

To ensure the requisite high standard of quality of material and workmanship, the contractor employs both resident and travelling inspectors who are controlled from the head office supplies department. They issue reports following each inspection, to the head office for final approval or, in some cases, rejection. In the case of the inspection of refractories, samples are selected at each contract site and submitted to laboratory tests before final acceptance.

A little publicised department in all the activities of the contractor is the laboratory. The laboratory will advise all those concerned on the many problems which arise apart from its regular service of carrying out analyses, etc., of solid, liquid and gaseous feedstocks and by-products as well as the testing of refractories, etc.

We now come to the activities of the transport section of the supplies and services department. This section is required to record the delivery of materials against orders. It prepares detailed weekly returns of weights of refractories, steelwork, castings, etc.; it will obtain a clearance from site for all materials forwarded so that suppliers' accounts may be passed for payment. This section will also take action in all cases of breakage and loss through transit and will arrange for submission of claims for compensation, etc. The checking of rail and all other carriage charges rendered by suppliers comes within the scope of this section who also negotiate special rail rates where the traffic will justify such an arrangement. They also organise the shipping of materials for foreign contracts and keep sundry records which are available for the construction and other departments of the organisation.

Cost of Materials

The effective control of the erection cost of each contract is of great importance to the contractor and to the industry which employs him. This control is provided by the costing department which, under the direction of the secretariat, will present to the construction department, week by week, a detailed sectional labour cost for every contract in hand. The costing department also deals with the cost of materials provided for each contract. Invoices as received from suppliers or sub-contractors are checked against copy orders and also compared with the signed advice notes received from the contract site. Only after the invoice has been through these two checks and tested generally for accuracy is the invoice released for payment by the accounts department. It should be noted, also, that every order placed by the purchasing section passes through the estimating department, who will record it against that section of the estimate for which the material has been ordered. The copy order flows to the costing department who are then ready to receive, check and allocate the suppliers' invoice to its appropriate contract and section. In this way the cost of materials for each contract is built up within the framework of the estimated cost.

We may now further consider the construction department and their activities on the site where the plant is in course of erection. The choice by the construction department of a starting date on site is, of course, of great importance. It must consider the question of site clearing and levelling, the necessary pile driving and completion of foundations prior to the arrival of the first items of material on site. It must also consider the continuity of delivery of materials so that the work, once started, can proceed without interruption.

Site Engineer's Job

The site engineer appointed to carry out the particular contract will, of course, be given the assistance of regular experienced foremen and key men in each of the trades required. According to the size of the contract he will have with him the necessary clerical and technical assistance and will be responsible, also, for obtaining local labour or for arranging for the transfer of personnel from contracts being completed. The labour section of the head office is, of course, always at his disposal to assist.

The site engineer receives the drawings from the head office as they are issued and proceeds with the setting out of the work. He will check at all stages that the construction is proceeding accurately to the drawings supplied. He will also have an erection and delivery programme. Delivery of the major items of apparatus and material is planned and progressed from the head office and any changes required, either in sequence or time of delivery, must be arranged by the site engineer through the head office.

With all deliveries of apparatus and materials the site engineer will receive advice notes in duplicate. He will check the materials and will sign one copy which will be forwarded to head office and will constitute the certificate for payment to the supplier. In cases where sub-contractors are employed on the site, the site engineer will issue certificates for progress payments in accordance with the work carried out.

It will be of interest to note that the construction engineer at the head office will have provided the site engineer with a schedule of target costs covering each section of the contract. These target figures will be based on previous experience in carrying out similar work but adjusted to suit the known site conditions, etc. While the site engineer will in few cases improve upon the target figure, he is expected to adhere to it as closely as may be possible.

However competent may be the site engineer, it is impossible for him to carry out a contract efficiently unless he is provided with reliable modern tools, tackle and equipment. A contractor with a substantial turnover is able to serve his clients well in this respect since he will possess a large and varied amount of equipment from which a selection can be made and is best suited to the needs of the particular contract in hand. Through a well organised plant department he can ensure that all tools and tackle are kept in first-rate condition and that they are available on site as, and when, required. The site engineer will have the advantage of the advice of the plant manager—himself an engineer of wide experience—who is responsible for the provision of whatever tools and tackle are required and for their reconditioning as they are returned from one contract before being despatched to another.

Those concerned in the head office with the design of the plant will make every effort to ensure that it conforms to Factory Act Regulations and that full provision is made for the safety of those who will be concerned

with its operation. It is, however, the responsibility of the site engineer to ensure that safety is considered at all times in connection with the provision of erection equipment such as hoists, winches, scaffolding, machinery guards, etc. He will take every possible precaution to ensure the safety of those who are working on the site.

Further to ensure safety in construction, the head office employs a safety officer who will visit all contracts at intervals in order to ensure that the intepretation of all the regulations is consistent and that the precautions are effective and adequate. In this connection, infrequency of accidents has an important bearing on the premium which the contractor pays for his insurance.

Shortly before the completion of the erection of the plant, the operating engineer who has been appointed by the head office operating department for the contract will arrive, with his assistants, on the site. The organisation of the operating department is rather similar to that of the construction department. It comprises senior operating engineers at head office, each with a number of areas to control. They pay visits, as necessary, to contract sites to advise and instruct the local engineers. Before a plant goes into production the operating engineer will test and try out various parts such as pumps, automatic operating equipment and machinery generally. He will arrange with the client for the provision of those men who will eventually be responsible for the operation and maintenance of the plant and will commence to train them in their duties.

Eventually the plant is put to work, its teething troubles are overcome and, in due course, when the client is completely satisfied with its performance, it is 'handed over.'

Although in certain respects the contract ends when the operating engineer has finished his work, the contractor's interest continues not only during the 'maintenance' period but indefinitely. At regular intervals a senior operating engineer attached to head office will visit the plant to inspect, discuss and advise. Renewals and service can be planned and, as necessary, new materials placed on order therefor.

Final Reports

On the completion of their work on site both the site construction engineer and the site operating engineer are required to prepare reports on the many aspects of the work which they have carried out. The construction engineer's report will cover any difficulties experienced in erecting the apparatus and materials supplied, the type and suitability of the workers employed, and any peculiarities attaching to the site, all of which information will be of value if, and when, an extension of the plant is carried out.

The operating engineer will report on items such as feedstocks provided and any difficulties encountered in their carbonisation or gasification. He will criticise any features of design which are newly incorporated. These site reports are studied first by the responsible engineers at head office and subsequently by heads of departments, as well as directors and, in some cases, by the Chairman, who will consider any points which merit their attention. As a result, the design may be modified or other corrections applied so that each successive plant is an improvement on the last.

DISCUSSION

At the opening of the meeting, **Mr. R. M. Currie**, Vice-chairman of the Scottish Western Junior Gas Association, who presided, welcomed Mr. H. R. Hart, General Manager of Glasgow Division and a member of the Scottish Gas Board; Mr. D. Beavis, General Manager of the Edinburgh Division; Mr. E. C. Smith, Deputy General Manager of the Glasgow Division; and Mr. A. McFadyen, Glasgow, President of the Scottish Gas Managers' Association. Introducing Mr. H. S. Cheetham, he commented that this was only the third occasion in the history of the Institution of Gas Engineers in which the holder of high office was not associated either with a gas undertaking or an area board, the others being Sir Frederick West and Dr. Hartley.

The discussion was opened by **Mr. J. T. Christie**, Vice-president of the East of Scotland Association. He remarked that probably few of them had realised just how big a part the contractor had played in the shape and development of the gas industry. He asked if Mr. Cheetham would comment on the probable design of future gas-making plant, especially from the point of view of the old problem of 'one fuel or two.' He wondered, however, whether the contractor was still dictating the policy in future design. When the gas industry was nationalised, area boards were given the right to build their own plant, if need be. Should the boards take advantage of this clause in the Act? In fact, had many of them done so? The contractors, he added, employed highly-qualified personnel in all fields of engineering and at one time there was a constant interchange of staff between the contractors and the gas industry. Was that process continuing? Mr. Cheetham had brought out very clearly the considerable time taken for tenders to go through the various departments, obviously at great expense. What were the actual costs of tendering say for a small installation of plant and a large installation of plant? How many contractors should be sent the same enquiry, as obviously each would be involved in similar tendering charges which, at some later date, must be passed on to the purchaser?

Mr. Cheetham commented that the design of future gas-making plant depended on many factors. The gas industry at the moment was changing in a number of cases to oil, but he did not think that it was completely clear that that was necessarily going to reduce the price of gas. He thought that in the case of the Scottish area the likelihood was that they would be producing gas from coal at a price lower than that at which they could produce it from oil. A great deal depended upon the location of the particular works. If they were close to a suitable port it might well be possible to obtain oil or gas at a price more attractive than that for coal. It was difficult to be more specific because one heard of cases where gas produced in modern carbonising plant appeared to be cheaper than gas produced from oil. Regarding the principle of one or two fuels, Mr. Cheetham thought that this was a matter on which he was hardly competent to express an opinion. There were large stocks of coke up and down the country and whatever might be the future policy, there was little doubt that coke sales should

be encouraged by every possible means at the present time.

In regard to interchange of staff between the gas industry and the contractors, he did not think that this was very active at the present time. In this connection he said that certain contractors were collaborating very closely with the industry in a number of directions, notably research, and were providing engineers to assist gas undertakings in this work. It was not possible, he added, to give a general figure on the cost of preparing tenders because circumstances varied so much—it could be £50 or several thousands of pounds. The number of tenders which might be invited was entirely a matter for the purchaser to decide. It would probably be governed very largely by the fact of there being two or three firms, with any one of whom the purchaser would be happy to place his work. He might submit his enquiry to these two or three firms, but Mr. Cheetham thought that in most cases it would not go beyond say three invitations.

Mr. D. C. Campbell, Falkirk, said that it was a revelation to learn of the magnitude of the work carried out by the contractor before and after a particular job started. How big a problem was it, he wondered, to arrange that the work involved could be accommodated by the staff and, similarly, that the staff could be kept with work to do.

Mr. Cheetham replied that the variation in the contractor's load was, of course, always a problem, particularly in regard to staff employed on construction. They were occupied in many ways—on new construction which continued throughout the year, as well as in repair work, mostly during the summer period. It was usually possible in a large contracting organisation to spread the load fairly uniformly over the 12 months.

Replying to **Mr. E. G. Smith** who put a question on the reduction of carbon monoxide in town gas, Mr. Cheetham said that reduction of carbon monoxide was a straightforward and well-known process and there were no difficulties in carrying it out. His own company had for some time been studying the various aspects of this matter, but it must be noted that the design of plant depended a good deal upon the area board's decision as to the desired carbon monoxide content of any component gas comprising a part of the town gas supply. Replying to further points by Mr. Smith on the part c.w.g. plants had to play in this matter, Mr. Cheetham observed 'the point which we must all realise is that it costs money and we must make considerable economies in other directions to compensate for the money we are going to spend in reducing carbon monoxide.'

Replying to **Mr. A. McFadyen,** Mr. Cheetham said that his company had a number of engineers who were at all times studying development. He told **Mr. D. Beavis,** who asked about recruitment and training of staff, that they had a number of people passing through a training scheme. In addition, transfers were made from one department to another. There was quite a considerable interchange within the organisation. There was also very close liaison between the departments and even between individuals.

A vote of thanks was proposed by **Mr. J. G. Rutherforth,** President of the East of Scotland Junior Gas Association.

Safety Guide

MANY civil engineering contractors have been sent a safety guide setting out recommendations on those safety precautions shown to be the most important by a factual analysis of over 3,000 civil engineering accidents. The guide, issued by the Federation of Civil Engineering Contractors (Romney House, Tufton Street, Westminster, S.W.1) is in a handy pocket size and costs 1s. per copy.

In view of the complex nature of civil engineering works, the guide has of necessity been drawn up in general terms, but the Federation believes that the adoption of the recommendations in it will, so far as is reasonably practicable, form the basis for the establishment of safe working conditions on sites. It has asked the management of all its member firms to give the guide serious study and, as appropriate, to see that its recommendations are carried out on their sites.

Refractories Standard

IN a new British Standard publication, B.S. 3056: 1959, preferred nominal sizes are specified as a step towards simplification in the range of manufactured fireclay bricks and in their use in furnace construction. Based on a proposed range of sizes submitted by the National Federation of Clay Industries, B.S. 3056 has had the full support of the fireclay refractories industry, whose experience has been that the existing demand for a wide variety of sizes has resulted in short runs from machines and frequent changing of moulds. The range of sizes in this standard forms part of a similar but somewhat more extended range issued by the Scottish Employers' Council for the Clay Industries.

Obviously, users' requirements cannot be entirely restricted to the suggested size range, hence the use of the phrase preferred sizes' in the standard's title. But it is considered that the selection of sizes offered will meet most normal requirements; and, of course, nothing in the standard should be taken to mean that other types and sizes of firebrick will be unobtainable. The many tables in the 20-pp. publication are shown in association with 'keyed' diagrams. Copies of this Standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. Price 5s.

Automation Symposium

UNDER the ægis of the British Conference on Automation and Computation, a joint symposium titled 'Instrumentation and Computation in Process Development and Plant Design' will be held in the Central Hall, Westminster, London, next month.

Organised by the Institution of Chemical Engineers, the Society of Instrument Technology and the British Computer Society, the symposium will last for 2½ days. Subjects to be covered include the improvement of process efficiency, process control systems, application of on-line computers, design and use of analogue computers and the use of computer techniques in large and small companies.

FORUM...

Midland Junior Gas Association Quizzes Panel on Work Study

A 'WORK STUDY FORUM,' under the chairmanship of Mr. W. R. Branson, Deputy Chairman of the West Midlands Gas Board, was featured by the Midland Junior Gas Association.

The following were the panel:

Mr. H. E. Chapman, Work Study Officer, West Midlands Gas Board, Worcestershire-Herefordshire Division.

Mr. R. W. Greenaway, Assistant Work Study Officer, West Midlands Gas Board, Wolverhampton and District Division.

Mr. W. V. Olsson, Organisation and Methods Officer, West Midlands Gas Board.

The panel answered 16 questions.

QUESTION: Are there any special considerations attaching to the study of clerical work which do not apply in the case of industrial work studies?

Mr. Olsson said that work study, and organisation and methods, were aspects of the same technique and differed only in their application. The study of the relationship of people in an organisation was perhaps more important in organisation and methods work than in method study. Work study attached more importance to work measurement. It was difficult to measure clerical work because it was associated with mental processes. The approach to a study of clerical work must therefore differ from that of work study of manual operations.

Mr. Chapman agreed that it was difficult to measure clerical work. It would be possible, he said, to measure the work content in routine tasks such as making out invoices or typing, but mental work was usually involved and the difference between work study and organisation and methods lay in emphasis.

Mr. Greenaway, agreeing with the previous speakers, pointed out that to assess clerical work the human approach was different. It was quite possible that a job had to be discussed with the departmental manager who was probably responsible for installing the methods originally, and considering method study only, the investigation would probably be looked at in three ways:—

(a) The way the job was done, as explained by the departmental office manager.

(b) The way the job was done, as explained by the person doing the job.

(c) The way it should be done.

Mr. S. C. Crathorn (Wolverhampton) interposed to enquire if one could expect to hear of the appointment of mental-work study officers.

Mr. Olsson said that in the U.S.A. the measurement of clerical work was being done by breaking down every repetitive clerical job into a series of simple actions to each of which a standard time had been allocated; but he did not favour such an approach.

QUESTION: Would the panel indicate what line of action can be taken to assist the implementation of an incentive bonus scheme when faced with objections from the men concerned for reasons such as—(a) redundancy, (b) compensation, (c) union policies?

Mr. Chapman considered that these questions should be asked at a very early stage in the application of work study and not only when faced with objections. It was true to say that in the West Midlands Gas Board no one had been discharged as redundant although some men had been transferred to other work. As to compensation, there appeared to be a moral obligation to apply at least the level laid down in the Gas Act. Work study, went on Mr. Chapman, was fully supported by the unions and any objections would come from local level. Difficulties of this kind should have been considered and explained long before the stage of implementation had been reached. If these difficulties did arise then it was up to the management to negotiate with the men to settle them. The best way was for management to take the men into their confidence at an early stage.

Mr. Branson agreed with the last speaker that difficulties of this nature should have been foreseen and that management should plan accordingly.

Mr. Greenaway pointed out that in the Board's area the turnover of labour was still about 30% and good planning in either the time of the year, i.e.—allowing for seasonal fluctuations, or the planning of a move to suit other conditions, would take this into account and would cover a good proportion of the redundancy. In the matter of union policy, the board must realise that, having committed themselves to work study, there would necessarily be negotiations and they would have to be patient negotiations.

Mr. Chapman said that the acceptability of a bonus scheme was best ensured by man-to-man contact and not by posting notices. Work study officers well knew the value of this approach and often opportunities could be taken to discuss points with individual men during breaks in work study periods.

QUESTION: Can operational research be used to obtain improved yields and reduced operational costs from present materials using existing plant and equipment, or must we await the installation of new plant fitted

with increased automatic control and better instrumentation before this new procedure can be usefully applied?

Mr. Greenaway said that operational research could give the answer to problems if sufficient data was available, but it was necessary to allow sufficient time so that the problem could be identified. Engineers, he said, realised this, they were often faced with problems, but they had to be sure exactly what it was they were looking for, i.e., what the problem really was. As to the operating costs of existing plant, it was important to look into the question of the costs of the 'supporting' workers, i.e., such as maintenance personnel.

Mr. Olsson said that operational research was method study applied in a different way. In relation to the use of plant it was a question of the application of scientific study to all the problems involved after producing a mathematical formula to represent the over-all problem. The object of operational research was to obtain a solution representing the optimum, although in practice it is the solution which is both acceptable and possible which is needed.

Mr. Branson added that operational research could be employed in such cases as faults in rolled steel sections. If every operation in connection with the rolling of the sections were to be carefully noted, no doubt it would be possible to establish the cause or causes of faults.

QUESTION: Do the panel consider that functionalisation in the gas industry results in increased efficiency? Would they consider this from the viewpoint of a Board having a densely populated area with large towns, as opposed to one where the population is scattered over large areas, the majority of towns being small and separated by long distances?

Mr. Olsson said that this was mainly a question of policy on which he could only express his own views. He preferred to use the word 'specialisation' rather than 'functionalisation.' Mankind, he said, has tended to specialise since the beginning of history until, with the complex organisation of today, it is necessary for industry to adapt its management techniques to a greater degree of specialisation and endeavour to introduce controls and techniques which would ensure the unit working as a whole, i.e., to overcome any inflexibility introduced by specialisation.

Mr. Olsson then quoted Alfred Marshall, the economist, who said that the development of the organism, whether social or physical, involves an increasing subdivision of functions between its separate parts on the one hand and, on the other, a more intimate connection between them. Each part tends to depend more and more for its wellbeing on the other parts. The same principle could be applied to organisation generally. To be successful it was essential to have good communication and good co-ordination. It might be advisable to limit specialisation to district level so that the manager could give a good co-ordinated service to the consumers and so retain their goodwill. In the West Midlands Gas Board, some decisions had to be made at Board level and it would therefore be necessary to have a specialist at this level to advise on such decisions. From the foregoing Mr. Olsson concluded that the principles of functionalisation were the same whether applied to a large, densely-populated area or to one where the population was scattered over a wide area, provided adequate and effective communication and co-ordination was achieved.

Mr. Chapman agreed that one could have functionalisation at all levels to the top provided communication was good. As to whether it would make for efficiency, his view was that it would probably result in an increase in technical efficiency, but this might not appear to be so from the consumers' point of view. It would be essential, therefore, to ensure that complaints were dealt with quickly. There was the risk that with functionalisation a consumer might receive visits from what appeared to him to be too many men.

Mr. Branson agreed that the problem was not whether to have specialisation (or functionalisation) or not, but to decide the level of specialisation.

QUESTION: At the present time, where incentive bonus schemes are in operation, there is a loss of flexibility in production due to a tendency to plan production to fit in with schemes. What provision is made in the agreements to cater for reduced production, e.g., because of reduced demand or change in production policy?

Mr. Chapman said that there should be no loss of flexibility when incentive bonus schemes were introduced since the schemes should be designed to fit all circumstances. Schemes were worked on the basis of proportionate bonus for work done above a minimum. Clearly, if the demand for his product fell off, then it might be that a man would earn no bonus, i.e., if he worked below the level at which he was expected to perform for the daywork rate.

QUESTION: It is known that incentive bonus schemes have been introduced into works within the West Midlands area. In at least some of these works, there has been no question of redundancy, labour having been absorbed elsewhere in the works. The success, or otherwise, of work study is measured by the increase in productivity. In view of the above can it be claimed that in these works, work study has been successful?

Mr. Greenaway said that during the past 12 months in the West Midlands Gas Board, allowing for wastage and the movement of men to other work, incentive bonus schemes had been successfully introduced and in some cases it had been found necessary to move men back to their former work to make good wastage that had occurred. The movement of men to other work had always been to carry out useful work and not, as might be thought, to treat them as an excess labour cost. Mr. Greenaway agreed that work study had been a success and, provided there was a good approach, considering the human and practical aspects all the time, it should continue to be so.

Mr. Branson added that the question did suggest that the men who had been moved had previously only been wasting time and he therefore wished to make it clear that this was not the right view.

QUESTION: Do members of the panel envisage that they will, at some future time, reach a point in their investigations where the law of diminishing returns applies, or do they consider that theirs is a task with never-ending profits?

Mr. Olsson said that one must bear in mind the number of staff employed on organisation and methods in relation to the work involved. In the West Midlands

Gas Board the total organisation and methods staff was five and this worked out at one man per 700 supervisory, administrative and clerical employees. In America, a recent survey showed that one organisation and methods man for each 200 employees was normal and this ratio corresponded closely to the position in organisations in this country such as Shell-Mex and I.C.I.

It could therefore be said that far from the law of diminishing returns operating as a result of their investigations, they were at present losing ground.

Mr. Chapman added that one of the tenets of work study was, ' there is always a better way of doing a job.'

Mr. Branson said that no good organisation was ever static. Any new process meant that new methods had to be worked out. The gas industry was not dying but changing all the time.

QUESTION: Does the introduction of an incentive bonus scheme based on work study entail additional supervisory staff?

Mr. Chapman said that his answer to the question as posed was a definite ' no,' but work study investigations might show up shortcomings in administration and therefore more supervisory staff might be the outcome, their function being to see that over-all efficiency was raised.

Mr. Greenaway did not agree with Mr. Chapman. His view was that after work study had been carried out there would necessarily be a change of approach and attitude by supervisory personnel to ensure that the new specifications were applied, quality was obtained and that sufficient planning was installed and carried out to ensure the smooth running of any application. This could mean additional supervisory planning or controlling staff, but a good deal would depend on the type of job involved and the method of application.

Mr. Olsson considered that fewer supervisory staff would be required since the amount of work to be done would be less and more effective work study standards were available to management to exercise control.

Mr. Branson said that incentive bonus schemes might show up such faulty organisation as, say, waiting for certain auxiliary plant, e.g., compressors, and additional supervision might therefore be required.

Mr. Chapman repeated his view that although this might be so, it could not be said to be the result of the introduction of an incentive bonus scheme.

Mr. K. J. Crane (Birmingham) commented that this appeared to mean that better supervisory staff would be necessary and **Mr. Branson** agreed that the supervisory staff would have to be able to do all that was required of them.

Mr. S. K. Hawthorn (Birmingham) said that the incentive bonus schemes usually reduced the number of operations and therefore he felt that less supervision would be necessary.

Mr. Chapman added that additional quality demands might arise, while **Mr. Branson** felt that much depended upon the number of people involved.

QUESTION: What is operational research? What field of activity does the forum consider offers the best opportunity for operational research to give quick returns in the gas industry?

Mr. Greenaway felt that one must accept the definition as ' operational ' in activity and ' research,' investigation. Operational research had been carried out in the West Midlands Gas Board's area and good opportunities in this direction might well lie in connection with the transportation of gas to the grid.

Mr. Chapman defined operational research as the application of mathematical methods of analysis to managerial problems. A survey would be necessary to decide the possibility of good returns. The Board had done this in connection with the distribution of coal to the various gasworks. Another case which might yield useful results would be an O.R. study on the many variable factors influencing rodding in continuous vertical retort installations, following up the phenomenal reduction in rodding which had resulted in Birmingham from the installation of offtake temperature recorders.

Mr. Branson remarked that the national survey of broken mains now in progress was an example of operational research.

Mr. S. Brockbank (Newcastle-under-Lyme) enquired the difference between work study and operational research.

Mr. Olsson said that in operational research the problems were usually of such magnitude and contained so many variables that scientific approach was needed to find the optimum solution. As an example, the Esso Petroleum Company might endeavour to work out the optimum use for oil tankers plying all over the world. Generally speaking, those problems associated with transport proved most difficult due to rapid and frequent changes in conditions.

Mr. Branson gave as another example of operational research the determination of the number of radio-equipped service vans the West Midlands Gas Board would require to deal with emergencies over a period of, say, 12 months.

QUESTION: Would it be true to say that the introduction of organisation and methods is an accountancy gimmick to gain control of the gas industry; and would it be equally true to say that the introduction of work study is the natural reaction by the engineering side?

Mr. Olsson said that there was no antagonism between organisation and methods and work study. He rejected the suggestion that the former was a device to gain control of the gas industry, adding that he was himself an accountant and had no axe to grind.

Mr. Chapman commented that so much organisation and method work remained to be done on the accountancy side that there was no room for antagonism. It had been suggested earlier that work study tended to increase the number of engineering supervisors, whereas organisation and methods generally reduced the number of accountants, so if there was a battle, it was going in the right direction!

Mr. Branson felt the question was not a serious one. Accountants and engineers worked together and were certainly not antagonistic towards each other.

QUESTION: Occasions may arise where the ability of an operative to earn a bonus is restricted by circumstances outside the control of management, e.g., seasonal fluctuations in demand. In the panel's experience, does this lead to frustration on the part of the keener workers and therefore friction between them and management?

Mr. Chapman said that in his experience this had happened, with some friction with management as a result. The answer was to find these keen workers more

work to do. From this Mr. Chapman concluded that incentive bonus schemes had disadvantages, one of which was that they induced men to do more work for a purely monetary reward.

Mr. Greenaway said that from his experience men would accept the fact that their earnings were being restricted so long as they were satisfied that the circumstances were outside the control of management. Seasonal fluctuations were nothing new in the industry and operatives were aware of these fluctuations and have accepted the measure that they are paid relative to the work done.

Mr. Branson pointed out that loss of earnings during the summer when the demand for gas decreased was not new and men accepted the position. After all, he said, at one time it was the practice to discharge men during the summer months.

Mr. R. A. Hill (Birmingham) pointed out that the men now affected by incentive bonus schemes were short-service men, but it may well be that longer service men would ultimately be affected.

Mr. H. B. Bassett (Birmingham) commented that the method study aspect of work study must not be lost sight of. As the work was broken down into what work each man performed, it was essential to plan that, say, this summer period some men still continued to earn an incentive bonus. The men would expect to take it in turn to do their work for less pay.

QUESTION: Do operational research teams relieve existing management of any of its responsibilities?

Mr. Greenaway replied that the direct answer to this question was 'no.' The function of operational research was to provide a consultative service to help management to carry out its responsibilities. He always hoped that by introducing new techniques such as operational research, management would be encouraged to try a different approach to its problems.

QUESTION: Work study almost invariably results in an incentive bonus scheme whereby the operative enjoys a bonus, largely because his effort has become more productive and not necessarily because he works harder. The application of organisation and methods procedure to clerical work also results in an improvement in productivity and the staff concerned have to learn new techniques. Should they not also enjoy some reward from the savings effected?

Mr. Olsson agreed with this view but added that the question had very wide implications. Increased productivity linked directly with incentive schemes tended to give the personnel directly concerned with production a monopoly of the rewards arising from increased productivity. Technological progress and automation meant that the proportion of personnel directly linked with production will decrease and the proportion of non-productive workers will increase. If the increases in production are to be consumed, then non-productive personnel must receive part of the rewards of increased productivity. Taking a more limited view, Mr. Olsson felt that incentives for clerical work could only be applied to relatively few and that an incentive scheme was not necessarily the best way to deal with the situation.

Mr. Chapman agreed that money incentive bonus schemes were not basically a good idea. On the other hand, if one man now did the work formerly performed by two men he would expect to be paid something for so doing. The higher productivity obtained by incentive bonus schemes was not so much because the men were working harder, but because work study had eliminated wasted time.

Mr. Branson said that he was not sure that he agreed with Mr. Olsson's views since he felt that these problems tended to work themselves out in the long run. In the U.S.A., for example, it would be true to say that the clerk did not look upon the manual worker as his inferior.

Mr. E. B. Kirkby (Birmingham) asked if the need for bonus payments in conjunction with work study was reflected in the attitude of the unions, whereas organisation and methods was largely accepted by the clerical staff in the interests of higher efficiency.

Mr. Olsson agreed, and added that clerks could rise to important positions far more easily than could a manual worker and that in itself was an incentive.

QUESTION: What progress has been made in the application of work study at the drawing office stage?

Mr. Greenaway said that he would like to think that work study had been applied in drawing offices, particularly in connection with manufacturers of gas appliances.

Mr. Chapman said that a good deal had been done in this direction in other industries, and quoted the firm of I.C.I. whose design engineers had been given work study courses. The result was that plant had been designed more rationally and money thereby saved.

QUESTION: I believe that all jobs at production stations to which incentive bonus schemes have been applied concern plants operated at relatively steady loads, e.g., carbonising plants. Has an incentive scheme been envisaged for peak-load, i.e., water gas plant operators? If so, can the panel give an indication of how it would operate?

Mr. Chapman doubted whether an incentive scheme would be desirable for peak load working of plant such as water gas plants. It might be that such a scheme could be designed to reward increased operational efficiency rather than increased labour productivity, i.e., a scheme could be introduced to cover operational functions but not production standards. Bonus schemes in the less attractive applications might become necessary since, if some production workers enjoyed incentive bonus schemes, it was probable that the other workers would expect a similar incentive scheme.

Mr. Greenaway pointed out that it was by method study and work measurement that the work study investigator arrived at a standard against which an incentive bonus scheme could be worked out, but it did not follow that it must necessarily be used in that way. In other words, an incentive bonus scheme was not, as it were, 'the end of the line.' To give an indication of how a scheme would operate as questioned, it would be necessary to ascertain the following:—

(a) What work was done irrespective of gas production.
(b) What work was done relative to gas production.
(c) Any routine maintenance work which may or may not vary with the volume of gas produced.

Having found some answers to these questions, the result might be that the variations in work content and the minimum labour employed would not warrant any further investigations.

Mr. S. C. Crathorn (Wolverhampton) asked if the questioner had in mind that it was more difficult to find water gas operators than retort house workers since the latter could earn more money?

QUESTION: Generally, the worthwhile employee wishes to be paid for work that he does, together with the responsibility undertaken, the less worthwhile employee wishing to be paid for the position occupied irrespective of work accomplished and true responsibility undertaken. Is it envisaged that some time in future, financial incentives will be offered employees such as typists and showroom assistants, which will tend to eliminate the grievances of the hard-working and enthusiastic employees?

Mr. Olsson said that this question had two aspects. (a) As to responsibilities undertaken; all employees accepted responsibility in some form or another. It then became a question of measuring responsibility so that those with the most were paid accordingly, a most difficult problem. In this connection Mr. Olsson said that responsibility inevitably meant that decisions had to be taken. This in turn had to be divided into periods or degrees of responsibility, the length of time a decision would have its effect, e.g., a decision made by the Chairman of a Board as compared with the decision an office boy made in the act of sticking on a stamp. (b) Routine office workers could be trained to do a good day's work—generally speaking they wished to do so. Therefore, taking typists as an example, the approach was not to devise incentives but to increase their skill. It was found, went on Mr. Olsson, that a typist left school with a typing speed of, say, 40 words per minute, but in the office she usually typed at about 25 words per minute. He felt that it should be possible to train typists to type at 80 words per minute with fewer errors and with less fatigue as a matter of habit.

Mr. Branson, summing up the questions put to the panel, said that it seemed to him that the interest in incentive bonus schemes amounted to an obsession. It did not follow that work study would inevitably be followed by an incentive bonus scheme which should only be introduced if there was no better way. He felt that perhaps the wrong impression had been given as a result of the Board's decision to start work study in the retort house where the efficiency of labour was low as compared with that in other areas. There were a number of other jobs awaiting work study, among them the work of the gasfitter, design of appliances and ways of fitting them better.

Management's job was to manage—the function of work study was to help management to manage and in no way to relieve management of its responsibilities.

Mr. Branson expressed his surprise that none of the questions touched on the fact that work study gave more and better information, e.g., though a gasfitter might be known to average so many jobs a day, the question of how he spent his time remained unanswered in the absence of a detailed study such as work study provided.

Mr. Branson then referred to work study as applied in connection with manufacturers of gas appliances and said that he hoped to see a closer liaison between manufacturers and the area boards. Finally, he thanked the audience for the questions put to the panel and the latter for the way they had dealt with them.

Mr. G. W. F. Cockayne (President) thanked Mr. Branson for taking the chair and **Mr. S. C. Porter,** Senior Vice-President, proposed a vote of thanks.

GAS ON THE CONTINENT

French Research Department Reviewed

THE quarterly record of the work in hand in the Research Department of Gaz de France, reported in the January number of the French *Journal* under its new title *Journal des Industries du Gaz,* deals first with the work of the Operational Research Group and then presents a brief description of certain equipment and apparatus for test and research which are now available in laboratories and semi-industrial workshops.

The Group undertakes investigations which involve highly specialised study or which necessitate the use of electronic computers. These are classified under three headings, statistical studies, the use of electronic numerical computers and miscellaneous.

The statistical study of leakages in distribution systems has resulted in relating these to the length, L, of mains in the system, and to E, the volume of gas emitted. It has shown that they vary as if the leakage, F, is divisable into two parts respectively proportional to the length and to the emission (gas flow) in the form $F = AE + BL$.

As a first approximation, the first term corresponds to errors of metering, the second to real leakage in the system. One can determine as a function of the ratio L/E a mean reference value of the percentage leakage F/E. For a given system, the ratio between the percentage of leakage and the mean reference value is the relative coefficient of leakage, which is a better indication than figures used hitherto (percentage of leakage and leakage per kilometre) of the character of the system from the point or view of unaccounted-for gas. This coefficient can assist in estimating the opportunity and economy of works to be undertaken to reduce leakage.

It is possible, by following the variations of the coefficients A and B over several successive years, to appreciate the evolution of technical conditions influencing leakages.

Statistical studies have also been undertaken to determine the frequency and duration of periods of low temperature in the Paris region—the probability of occurrence, in the course of different parts of the winter, of

a period of a certain duration, during which the temperature remains below a given value. This study was undertaken with a view to determine precisely the best relation of the underground storage at Beynes, because the rate of withdrawal from a given well is limited by the 'water coning' (the formation of a cone of water at the base of the well when gas is withdrawn from it), the magnitude of which varies with the duration of withdrawal.

Finally, the Group has made a close study of the statistical laws relating to emission of gas in the Paris region to the different relevant factors—day temperature and that of the preceding days, place of the day in the week, wind velocity, etc.—in order to reduce the deviations between observations and the theoretical law.

Electronic numerical computers are improving rapidly, enabling the resolution of problems of more and more complexity. These machines are used for the calculation of complicated distribution systems and give results 'at a considerable speed and without risk of error.' They have also been applied to the calculation of the flow of gas in a main meeting variable demands. The Group is studying a new method of approaching this problem.

The electronic calculator is also applied to the determination of the optimum conditions of working—as, for instance, in the transport of propane from different refineries to different points of consumption.

Among the miscellaneous studies was that of the economics of an underground storage for natural gas in the Vernon region.

'The rapid evolution of laboratory equipment is a characteristic of modern research. It is not exceptional that apparatus becomes out of date after five years of use, often less for the very new techniques.' The record proceeds to a review of the new apparatus used at the Research Centre for the solution of the more and more complex problems presented by the gas industry.

The technique of mass spectrometry permits the identification of a substance from the mass of its molecule and of its fragments, ionised by a bombardment of electrons.

Electronic Bombardment

Substances to be analysed are introduced in gaseous form into a chamber where pressure is of the order of 1/1,000 mm. Hg. The molecules are then submitted to an electronic bombardment which ionises and dissociates them; the particles, initially accelerated by an electric field, follow a trajectory bent according to the mass and charge by the simultaneous action of this field and a magnetic field. The ions thus dispersed strike a target successively, the points of impact establishing their identification; their number, characteristic of the concentration of the element, is determined by the measure of the current resulting from their discharge. The apparatus at the Research Centre was constructed by an American firm. Among the numerous applications of this apparatus are mentioned the complete and rapid analyses of gaseous mixtures (say, ten analyses of cracked gases in a day), the complete analyses of natural gas and refinery gases and the determination of trace constituents of the order of mg. per cu. m.[3]

The Research Centre at Landy possesses apparatus for gaseous chromatography of four different designs. The American 'Perkin Elmer,' automatic and recording, the 'Velut-Jourda' patented by Gaz de France, automatic and recording, and the 'Dumay-Wettstein,' hand operated and recording, and the 'Tertre,' automatic and recording, made by the Ste. Carbochimique of Tertre (Belgium).

The last-named, designed to work up to about 300°C., is reserved for the analyses of liquid products. It enables, particularly in the case of tar oils, the separation of heavy constituents, difficult if not impossible to obtain by fractional distillation. The other three are mostly used for the analysis of gases. With certain limitations (N_2 and O_2 cannot be separated because they have the same 'retention time') rapid analyses, less than an hour, can be made of refinery and town gases. Trace constituents can also be detected.

Convenient Apparatus

Three recording spectrographs of the infra-red absorption spectrography type are installed. The 'Beckman'—a robust and convenient apparatus for industrial research, the 'Turk' apparatus 'à réseau,' of great sensitivity over a restricted range, and the 'Perkin-Elmer,' an excellent research apparatus with great possibilities of dispersion by prism over a wide range. This technique has been used notably for the study of the formation of gums, the analysis of the different hydrocarbons present in certain condensates, etc.

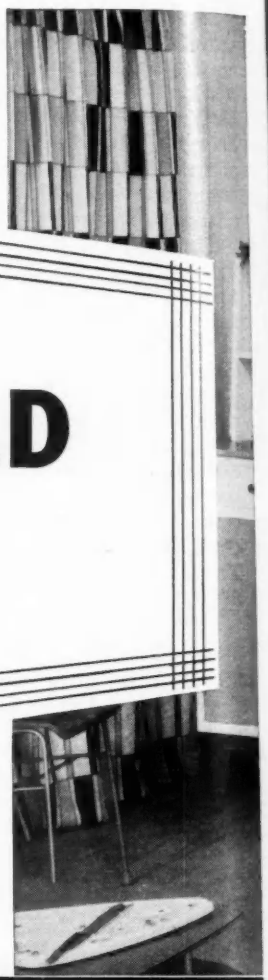
The substances to be analysed by ultra-violet (emission) spectrography are volatilised by electric arc or sparks. The peripheral electrons of the different atoms emit a characteristic electromagnetic radiation. This radiation, dispersed by a prism, gives rise to a spectrum of rays received on a photographic plate. The position of the rays defines the nature of the constituent and its concentration is given by the intensity of the blackening. The apparatus in use at Landy is the 'Huet,' type U.V.120. Among its applications are the study of pigments in paints, the distribution of nickel in catalysts, the study of metallic-carbonyls in gases and certain particularly complex analyses of metallic constituents.

As in the infra-red technique, spectrography of ultra-violet absorption utilises the property of transparent substances to absorb characteristic radiations.

At Landy there is in use the automatic spectrophotometer-recorder 'Leres' which operates over a wide range. Its sensitivity can be several parts per million. Its possibilities are numerous; in liquids, the study of structure in organic chemistry, determination of cathions by colorimetry and by fluorescence; in solids, by absorption spectra (transparent substances), surface reflection, etc. The spectra of light sources and flames, of the sensitivity of photo-electric cells, etc., can also be studied.

Among the results obtained, thanks to this apparatus are, qualitative analyses of the oils used for tests on the conditioning of gas, qualitative and quantitative analyses of metallic carbonyls in gases and the verification of the purity of certain products. A catalogue of absorption spectra is in course of preparation.

The polarography technique, of relatively recent introduction, is based on the interpretation of the current-tension curves obtained in the course of the electrolysis of ionised or polarised solutions.



Another Winner—

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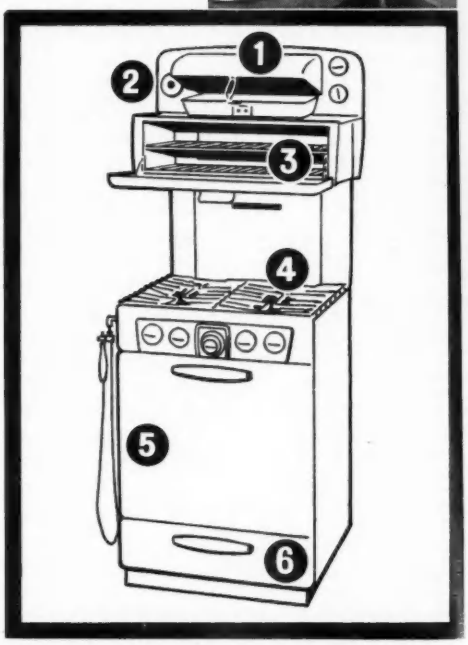
2. 4-hour Timer
3. Self-heated Warmer
4. Radoflex Burners
   Automatic Hotplate Ignition and taper
5. Large Oven with Drop Door
   and removable top lining
6. Storage Drawer



CASH PRICE £58.10.0

✱ OVERALL DIMENSIONS: HEIGHT 60¼", WIDTH 25¼", DEPTH 22¾"

Once again NEW WORLD PRODUCT OF Radiation Ltd **leads the way**

RADIATION GROUP SALES LTD., 7 STRATFORD PLACE, LONDON, W.1

TRADE NEWS

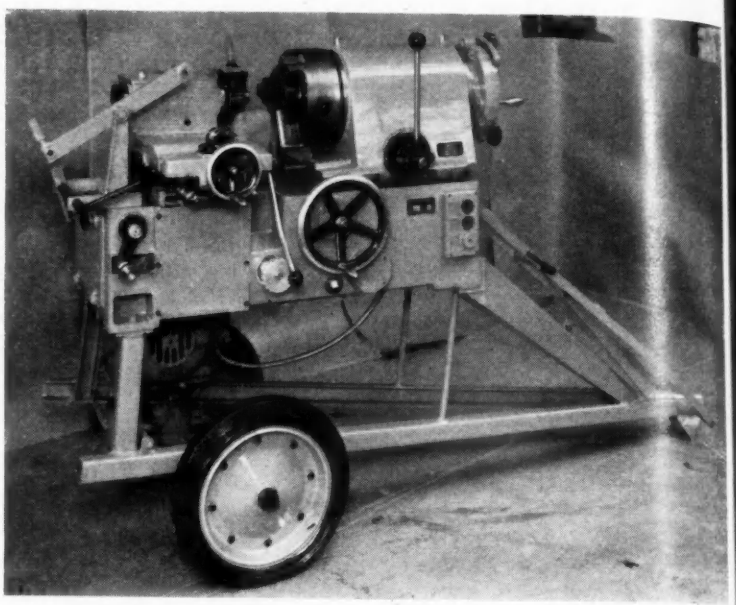
Portable tube cutting and screwing machine

J. C. NEVILLE LTD., who some years ago introduced to the British market the famous R.G. range of tube cutting and screwing machines, announce the introduction of the R.G.-Auto for which they have been appointed world agents.

Operating on the now familiar principle the R.G.-Auto will cut, bevel and thread tube from ¼ in. to 4 in. diameter cleanly and free from burr, at the touch of the appropriate switch. It will cut parallel or taper threads to all British and foreign standards. The machine will cut a 1-in. thread in 20 seconds, a 2-in. in 40 seconds, or a 4-in. thread in two minutes.

No re-setting of the tubing is required when changing from cutting to threading, or vice versa, and only very minor adjustments are necessary to the machine when changing from one thread to another.

The machine can be supplied with electric or petrol drive as a portable unit (trolley or trailer) and for workshop use a bench fitting model is available.—*J. C. Neville, Ltd., 34, Priest's Bridge, London, S.W.14.*



The R.G.-Auto by J. C. Neville Ltd. The machine can be supplied with electric or petrol drive as a portable unit, and for workshop use there is a bench fitting model.

EQUILIBRIUM WATER FOR RESEARCH

THE new Elgastat laboratory de-ioniser Mark II has been evolved from the Elgastat B.102, and is designed specifically for the provision of equilibrium water for academic and industrial research. A number of improvements have been embodied in the new model. The meter panel is made in anodised corrosion-resistant aluminium, and the conductivity meter and switches are waterproofed. The meter movement is designed for greater accuracy at both ends of the scale, and 'O' rings have taken the place of the former washer between the storage tank and cartridge, ensuring positive sealing. A drip-proof control valve is fitted, and a polythene dust-cover forms part of the unit.

Flow rate is 15-18 litres per hour. No regeneration *in situ* is required.—*Elga Products, Ltd., Ion Exchange Division, Railway Place, London, S.W.19.*

Centrifugal casting

CHARLES CARR LTD., specialists in non-ferrous metal castings, claim that a new centrifugal casting machine at the company's Smethwick, Birmingham, works produces cored bar which is 'absolutely guaranteed to be free from defects.'

The company also have a complete range of non-sparking tools.—*Charles Carr Ltd., Smethwick, Birmingham.*

Large compressor field re-entered to meet increased use of air

SO as to limit the range, in the interests of production, to those sizes of compressors most in demand, Broom & Wade Ltd. have not since the war manufactured compressors with a capacity higher than 1,000 cu.ft. free air per minute. With the vastly increased use of air in manufacturing plants, there is a growing tendency to require large compressors, and with an entirely new design, the company is now re-entering the field of the large capacity machine.

The Broomwade L2000 is a very compact plant, with the H.P. and L.P. cylinders arranged at 90 degrees to each other in an 'L' shape. The crankshaft is short and rigid, and the out-of-balance forces are reduced to a minimum, thus eliminating vibration to a great extent so that only inexpensive foundations are required.

In the design, attention has been paid to port areas and the stream-lining of the air passages so as to gain the maximum possible efficiency, the intercooler being so placed to give the least possible restriction to the air flow from the L.P. to H.P. cylinders, while providing ease of access for maintenance.

The air inlet valve is controlled by air pressure from the receiver acting on a differential valve assembly which actuates a power cylinder operating the lever on the inlet valve. This arrangement is so sensitive that air pressure is controlled to within plus or minus 1 lb. per sq. in.

In the standard arrangement the motor armature is fitted direct on the shaft extension of the compressor crankshaft, this making a compact unit which can be easily installed. The illustration shows an auto-synchronous flywheel type motor, or if desired, the compressor can be driven through vee-ropes from an independent motor, this necessitating fitting a grooved flywheel.

Specification: L.P. cylinder bore, 27 in. (685.6 mm.); H.P. cylinder bore, 16½ in. (412.7 mm.); stroke, 10 in. (254 mm.); inlet pipe o.d., 12 in. (304.8 mm.); outlet pipe o.d., 8 in. (203.2 mm.).

Speed, Motor H.P. and Capacity, Direct Drive: 50-cycle supply, 375 r.p.m., 415 H.P., 2,200 cu.ft. free air per minute (62.3 cu. m.); 60-cycle supply, 360 r.p.m., 400 H.P., 2,080 cu.ft. free air per minute (58.9 cu. m.).—*Broom & Wade Ltd., High Wycombe, Bucks.*

Simplified control for loading shovels

THE Chaseside Loadmaster loading shovels are now available with fully automatic transmission and torque convertor. The installation of this transmission reduces the number of foot controls to two, brake and accelerator, and the gear lever is replaced by a forward and reverse shift lever. This simplification of controls reduces the time taken for a full operating cycle as well as reducing operator fatigue. The torque convertor proportions the power to meet the load conditions and reduces shock loads to the engine and transmission.

Other driver aids on the Loadmaster include power assisted steering and a weatherproof cab.—*Chaseside Engineering Co., Ltd., Station Works, Hertford, Herts.*

CORROSION VOLTMETER SENSITIVITY

IN order to achieve high sensitivity and rugged performance, the makers of the Guardion corrosion voltmeter, produced in conjunction with W. G. Pye & Co., Ltd., combined an electronic circuit having an input impedance of 50 megohms with a 100 microampere moving coil indicating instrument, having a 5 in. mirror scale for ease of reading. Input impedance of this instrument gives a sensitivity comparable with a field potentiometer, and its advantage in the measurement of transient or fluctuating potentials makes it useful for the detection of stray currents and interference testing.

Forward and reverse reading facilities are provided in addition to a built-in battery check circuit. Calibration is easily checked against a standard cell or laboratory standard voltmeter.—*F. A. Hughes & Co., Ltd., 4, Stanhope Gate, London, W.1.*

BELT IDLERS

MAVOR & COULSON'S idlers for belt conveyors are described in a catalogue just issued which includes full tables of sizes and weights, views of applications, sectional pictures, and an explanation of how the idlers are able to run so easily for so long. The types include idlers for belts from 14 to 60 in., cushion rollers of which 70% is rubber, steering idlers for reversible belts, idlers for picking belts, return idlers—plain, covered, disc for sticky material, and steering—also idler-boards and inverted troughing for carrying the idlers. A new chart quickly gives the width and speed of belts for conveying any of six weights of material at any required rate.—*Mavor & Coulson Ltd., Farme Cross, Rutherglen, Glasgow.*

Potentiometer recorder can measure up to 18 points

A NEW potentiometer recorder of high quality, the Type 1550, is now available from Ether, Ltd. Completely self-contained, it can record up to 18 independent points on an 11-in. wide easy-to-read chart, and offers seven variable chart speeds. Numerals, symbols and six variable colours can be printed, so that each record on the chart can readily be distinguished.

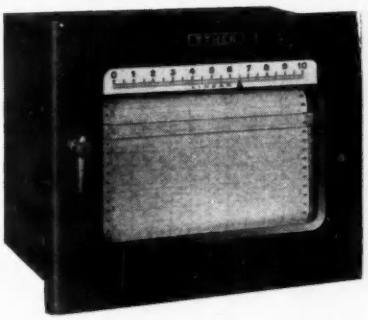
Measurements can be made of such variables as temperature, speed, strain, pressure, hydrogen ion (pH) and other quantities that can be expressed in electrical signals. Temperature can be measured through thermo-couples or through the Ether 'Forgemaster 60' radiation pyrometer.

The new potentiometer recorder is available in a wide selection of standard scale ranges. A clean, simple design offers good accessibility for servicing and inspection.

The instrument is maintained in a permanently standardised condition by a voltage stabiliser unit which can maintain voltage across the bridge to better than 0.1% during a 20% change in supply voltage. However, as an additional refinement to permit an occasional check to be carried out, a manual calibration check unit is also incorporated.

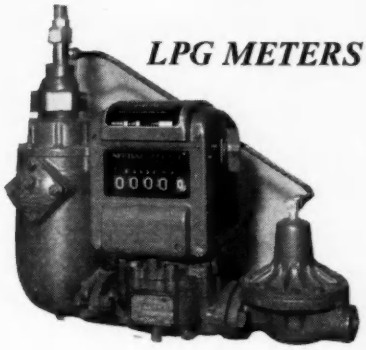
Other features include a specially-designed amplifier, the components of which have undergone extensive tests and selection, a full-scale printing carriage which takes only two seconds to travel across the calibrated chart, and a simple plug-in unit for easy range changing.

The instrument is contained in an all-welded steel case, sealed against dust and moisture.—*Ether Ltd., Tyburn Road, Birmingham, 24.*



Type 1550 Ether potentiometer.

LPG METERS



Neptune L.P.G. meters, made in the United States, are now available in this country in three sizes. Type 4D (1¼-in., 1½-in. and 2-in. models) are self-contained, including all accessories. A differential valve, assembled with the meters, maintains the product in liquid form in the meters. The meters are designed for a working pressure of 250 lb. per sq. in., and were developed for metering propane, butane, or other L.P.G. mixtures. Calibration is in U.S. gallons, but measurement in Imperial gallons or litres can be provided. Rate of flow of the three meters is: 1¼ in.—maximum 30 gallons per minute, minimum 5 g.p.m.; 1½ in.—maximum 60 g.p.m., minimum 12 g.p.m.; 2 in.—maximum 100 g.p.m., minimum 20 g.p.m. The meters are available in the United Kingdom through Cleveland Meters Ltd., Trunk Road Engineering Works, Redcar, Yorkshire.

Members have load of five tons

A SET of light pin jointed structural members with which numerous temporary structures can be quickly assembled and dismantled has been developed. The members, known collectively as Guyrex steel trussings, are either of box or H section, and are designed for a working load of five tons (ultimate 15 tons) in either tension or compression, have reinforced tongues which interleave together as clevices for connection by single 3½ in. diameter high tensile steel bolts in 1-in. diameter holes.

Members are stocked in 3 ft., 4 ft. and 5 ft. lengths (special lengths can be supplied) so that several sizes and types of truss can be assembled. Trusses are connected laterally at different distances apart by simple cross bracing. As members weigh only 61 lb. per ft. and are sheradised, the equipment is ideal for conveyance to inaccessible places and storage in adverse conditions. Accessories which include bearer angles, jacks, bogies, castors, and runway joists enable a wide range of temporary load bearing structures to be made with this equipment, such as conveyor bridges on trestles, light road bridges, suspension foot bridges, travelling platforms and gantries, framing for shuttering, pontoons and sheds.—*Guyrex Equipment, Ltd., 25, Craven Street, London, W.C.2.*

Gasholder anti-freeze

Over 100 Crowther-Dryden electrical antifreeze equipments are in operation in the British Isles. Service vans can give immediate pre-winter servicing to the equipments.—*Thomas Dryden & Sons, Ltd., Grimshaw Street Foundry, Preston.*

Complete service

Winn & Coales, Ltd., announce the formation of a contracting department to carry out operations for the protection of plant, pipe-lines, structural steelwork, etc. For the present it will operate from their Northern area headquarters in Cheshire. The company now provides a complete anti-corrosion service, including cathodic protection (in conjunction with the Denso system).—*Winn & Coales, Ltd., Denso House, Chapel Road, London, S.E.27.*

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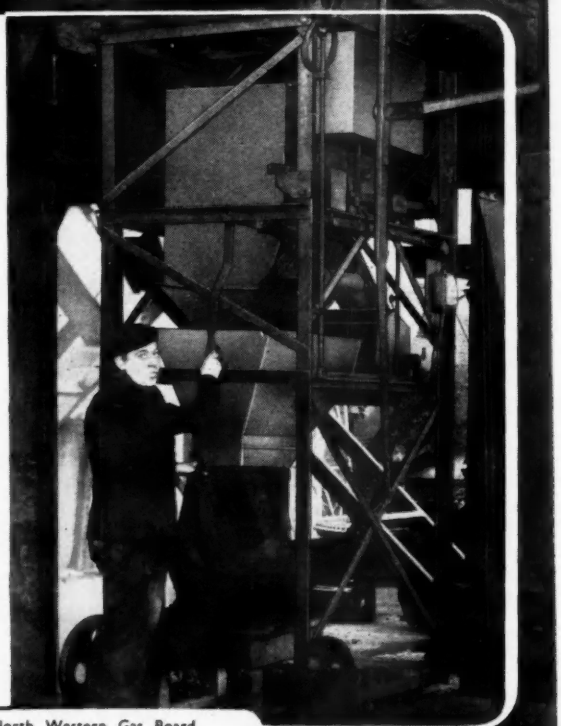

By Courtesy of the North Western Gas Board